

Innovations for Controlling Temperature on Heated Godets

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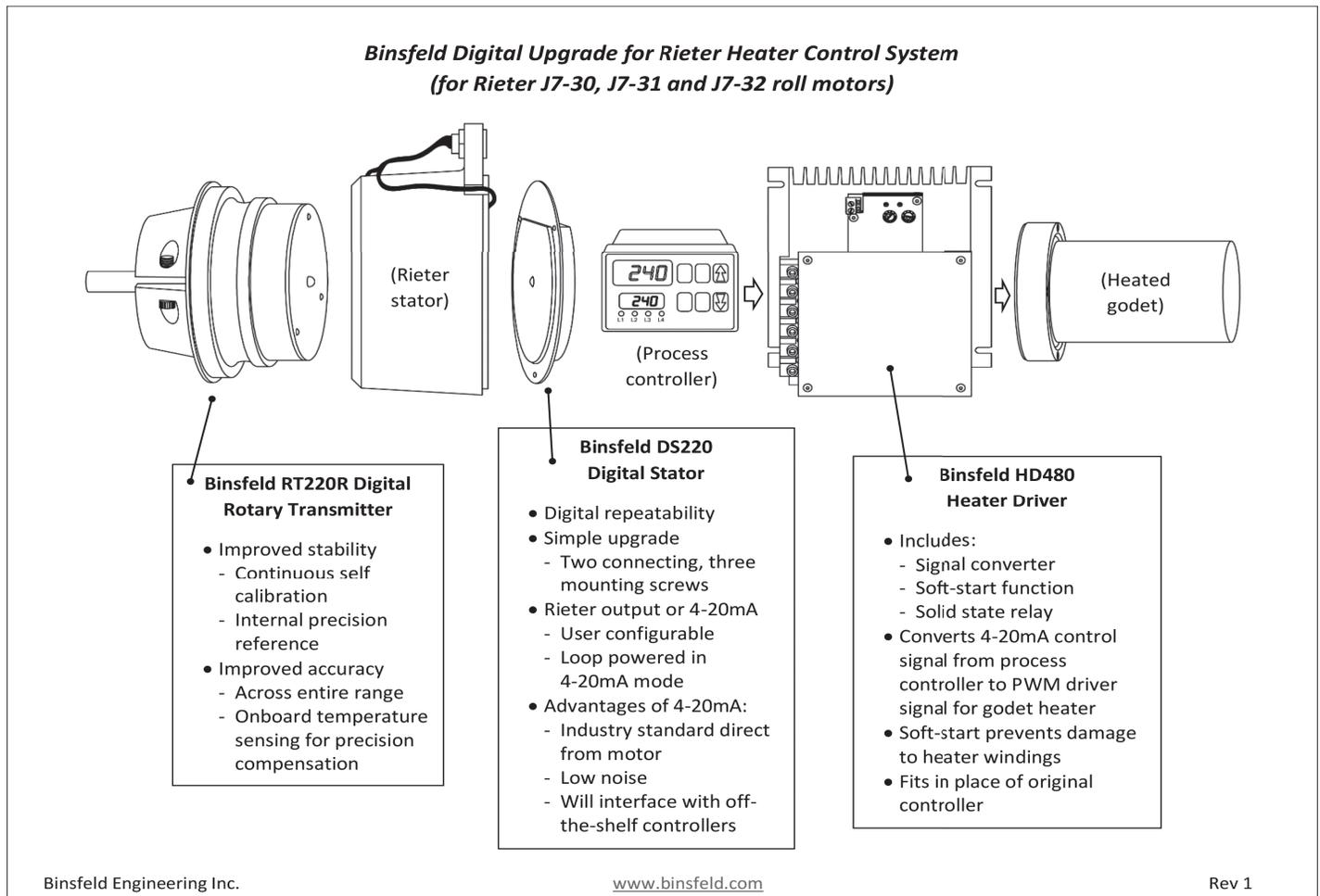


Figure 1: Binsfeld upgrade diagram

Controlling temperature on machinery has always been a challenge for maintenance and quality professionals in the textile industry. This challenge is even more complex on heated godets since in most cases the sensor is spinning at several thousand RPM in a hot environment and requires a non-contact or wireless technology to transmit the temperature data/signal. In addition, as machines age, individual components that either monitor temperature or control temperature become unreliable or fail completely. The result is inferior or defective product and ultimately increased downtime and lost revenue.

Fortunately, thanks to advances in

technology, a relatively modest investment in temperature control equipment such as rotary temperature transmitters can make an old machine literally better than new. For example, the set of components that Binsfeld designed for Rieter extrusion machines: the RT220R Transmitter, the DS220 Digital Stator and the HD480-I Heater Driver with Current Output (Figure 1).

RELIABILITY & ACCURACY

In response to fiber producers around the world who want to extend the life of their sound but well-worn Rieter machines, Binsfeld Engineering Inc. has developed these three critical

components for upgrading the godet temperature control on J7-30, J7-31 and J7-32 roll motors. Installed individually or as a set, these three pieces offer the benefits of digital electronics including reliability and accuracy. In addition, they create an upgrade path from proprietary control signals to industry standard 4-20mA control, which allows the use of standard off-the-shelf process controllers for godet heater loop control.

DIGITAL DROP-IN

The problem inherent with analog circuits is that the components, and therefore the signals they generate, change with age and with changes in

the ambient temperature. In other words they tend to “drift” with time and temperature.

To combat this problem, the first component that Binsfeld designed was the RT220R Transmitter. This one-channel transmitter is a true drop-in replacement that’s built specifically for Rieter’s high-speed godet roll motors.

The RT220R boasts improved stability because it uses a microprocessor with precision components to perform continuous self-calibration. Developed with accuracy in mind, this system includes onboard temperature sensing so that it compensates in real time for changes in its operating environment to offer greater stability. In addition, its output frequency is derived from a stable crystal oscillator and precision components for greater accuracy. The microprocessor also performs low-pass filtering to smooth out the feedback signal, so the temperature on the heated godet is more constant. Finally, to survive in the harsh environment typical of extrusion machinery, Binsfeld encapsulates the electronics within a durable epoxy that can withstand thermal and mechanical stress.

To state it simply, upgrading a roll motor with the RT220R Transmitter improves the accuracy and reliability of the godet temperature readings; translating to better, more consistent fiber quality, lower maintenance costs and less downtime.

FROM UNIQUE TO UNIVERSAL

While the RT220R Transmitter is digital, and therefore more accurate and reliable, it still generates a non-standard frequency output signal. To convert that frequency to a universal 4-20mA signal, Binsfeld created the DS220 Digital Stator. The DS220 mounts in place of the original stator circuit board on the Rieter stator housing. It receives the optical Rieter frequency signal directly from the original analog transmitter or the Binsfeld digital RT220R Transmitter.

Like the RT220R, the DS220 is digital. A key feature is that it can be configured for one of two different output signals (frequency or current) by



RT220R Rotary Temperature Transmitter



DS220 Digital Stator

changing a set of jumpers (wired connections). When in frequency output mode, the system uses the same power and is a direct drop-in replacement for the Rieter stator circuit. Alternatively,

when in current output mode, the circuit is powered by the 4-20mA loop from the machine’s temperature loop controller. This helps reduce noise and temperature coefficient, or drift, so



HD480-I control circuitry

users can trust the temperature readings on their Rieter machine.

With frequency or current output signals available, the fiber producer can use either the original frequency-based control system or convert to a more universal current-based control system.

PRECISION CONTROLLED POWER

There is one other important device in the godet temperature control loop, which can benefit from a digital makeover and can significantly impact godet temperature control: the heater driver. The heater driver uses a low-amplitude control signal (such as 4-20mA from a process controller) to control a high-amplitude power signal to the godet heaters (such as 480 VAC three-phase) through a solid-state relay.

The HD480-I Heater Driver that Binsfeld developed performs two primary functions:

- 1) It converts a 4-20mA (representing 0-100% on time) signal from the standard process controller to a pulse width modulated (PWM) signal to turn on the godet heater.

- 2) It “softens” the heater turn-on signal by limiting high current pulses to minimize stress on the heater windings for longer heater life. This second operation is referred to as a “soft-start” function.

For the PWM conversion function, Binsfeld incorporated a special fine-tuning feature. By adjusting a simple rotary switch on the HD480-I, plant personnel can change the pulse period over a range of 1 to 2.8 seconds to meet the response

time needs of the control loop. This can help achieve the tightest possible temperature control on the godet.

The soft-start function also offers a fine-tuning feature. The soft-start duration is rotary switch selectable from 0 to 200msec to match the needs of the heater.

The HD480-I control circuitry is powered from the process controller's 4-20mA output signal so no additional control power is required. The HD480-I fits directly in place of the original component, so no machine modification is required before installation.

FILLING A NEED

According to Stephen Tarsa, Binsfeld CEO, “The reason that Binsfeld developed these digital upgrade components is that original equipment manufacturers have ceased production and support of vital components. That makes it difficult and expensive—or in some cases impossible—for fiber producers to find replacement parts to keep their machines running. We’ve stepped in to fill that need for Rieter machines, Neumag machines, STP Impianti machines and others.”

“Our slogan of “Good. Better. Binsfeld.” means that we don’t simply build replacement parts. We design drop-in solutions that offer better performance, better features and great reliability. We see that as a good investment for folks with older machines,” Mr. Tarsa added.

TEMPERATURE SYSTEM

Binsfeld Engineering Inc. recommends speaking with their technical professionals before determining whether the RT220R, DS220, or HD480-I is the best fit for their situation.

For over 40 years, Binsfeld has been developing torque and temperature telemetry systems that empower technical professionals and maintenance staff within the textile industry and beyond. 

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